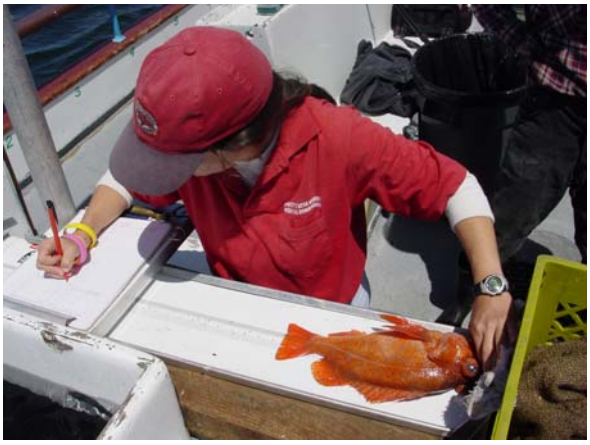
REPORT TO THE CALIFORNIA FISH AND GAME COMMISSION

California Recreational Fisheries Survey 2005 Annual Review



Prepared by

Department of Fish and Game-Marine Region

March 2006

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Introduction

The California Recreational Fisheries Survey (CRFS) was begun in January 2004 to provide catch and effort estimates for marine recreational finfish fisheries. It is a collaborative effort between the California Department of Fish and Game (the Department) and the Pacific States Marine Fisheries Commission (PSMFC), and is funded by state and federal sources.

The goal of the CRFS is to produce in a timely manner, marine recreational fishery-based data needed to sustainably manage California's marine recreational fishery resources. The CRFS is designed to meet the specific data needs for managing species with federal harvest guidelines or state allocations. The CRFS produces monthly estimates to help fishery managers track progress toward harvest limits and changes in fishing activities. The monthly estimates allow fishery managers to respond quickly to time-sensitive issues. The CRFS provides estimates based on target species or trip type which gives managers the ability to examine specific changes in catch rates and effort for each trip type. Catch and effort are reported by six geographical districts (Figure 1) to provide fishery managers with the ability to examine regional shifts in catch rates, average fish weights, and fishing activities on a relatively fine scale. Catch and effort estimates are also reported by four modes of fishing (that is, the type of place or boat where the fishing occurred): beaches and banks, man-made structures, commercial passenger fishing vessels (CPFVs), and private or rental boats. The CRFS data allow managers to tailor regulations and seasons to each region and mode of fishing, thus providing increased fishing opportunities while protecting overfished stocks. Specific data collection standards and criteria are provided in Appendix A.

The CRFS is also designed to meet the specific data needs for managing salmon, and ensuring that the biological and recovery goals for West Coast salmon populations are met. The CRFS samples at least 20 percent of the salmon taken by private boats and CPFVs. The CRFS collects the heads of salmon with coded-wire tags which are used to determine the contribution of various runs to the landings and to help determine run-strength.

Methods

The CRFS is a multi-part survey to estimate the total catch and fishing effort of marine recreational anglers in California. Field sampling is conducted at 664 publicly accessible sites during daylight hours, and alternate methods are used to estimate the catch for nighttime and private access fisheries. Data are collected by an access point field survey. Samplers intercept anglers that have completed fishing trips on piers, jetties, beaches, public launch ramps, CPFVs, and other locations on the coast where the public has access for fishing. The samplers ask the anglers questions about their fishing activities that day, and examine their catch to determine the number and species of fish caught. In most cases, the sampler also measures and weighs the fish.
A telephone survey of licensed anglers is conducted to get information on effort when field observations of effort are not feasible, such as fishing at night and fishing from boats that return to private marinas. A telephone survey of CPFV operators is also conducted to improve the effort estimates for this component of the fishery. The data gathered from field sampling, the telephone survey of licensed anglers, sport fishing license sales, and the telephone survey of CPFV operators are combined to estimate catch and effort (Appendix B).

Description of Districts and Fisheries

1. South District – Los Angeles, Orange, and San Diego counties. This highly urbanized district has many harbor and marina facilities for boaters, and has dozens of piers and other man-made structures that are heavily used by shore anglers. The coastal waters are influenced by sub-tropical currents from the south, and are home to warm-water pelagic species, such as tunas, yellowtail, and barracuda. The nearshore coastal waters and the Southern Channel Islands are fished for kelp and sand basses, white seabass, and California halibut.

2. Channel District – Santa Barbara and Ventura counties. This district is in an ecological transition zone that harbors both warm- and cold-water fish species. Warm-water pelagic species and surface species like yellowtail, barracuda, bonito, white seabass, and kelp bass are seasonally available, and cold-water species, including Chinook salmon and rockfishes, are also targeted. The Santa Barbara Channel and the Northern Channel Islands are fished year around by private boats and CPFVs based in the four ports in the district.

3. Central District - Santa Cruz, Monterey, and San Luis Obispo counties. The Central District has five major ports for private boats and CPFVs, and miles of open coast that are fished by surf anglers and rocky bank fishermen for surfperch, nearshore rockfish, and cabezon. Boaters fish for Chinook salmon in season and run offshore for albacore. Rockfish, cabezon, and lingcod are also targeted by boat anglers throughout the district. Large sections of the coast in southern Monterey and San Luis Obispo counties remain inaccessible to shore anglers, due to their remoteness or lack of public access.

4. San Francisco District - Marin, San Francisco, and San Mateo counties on the coast, and the six counties surrounding San Francisco and San Pablo bays (Alameda,

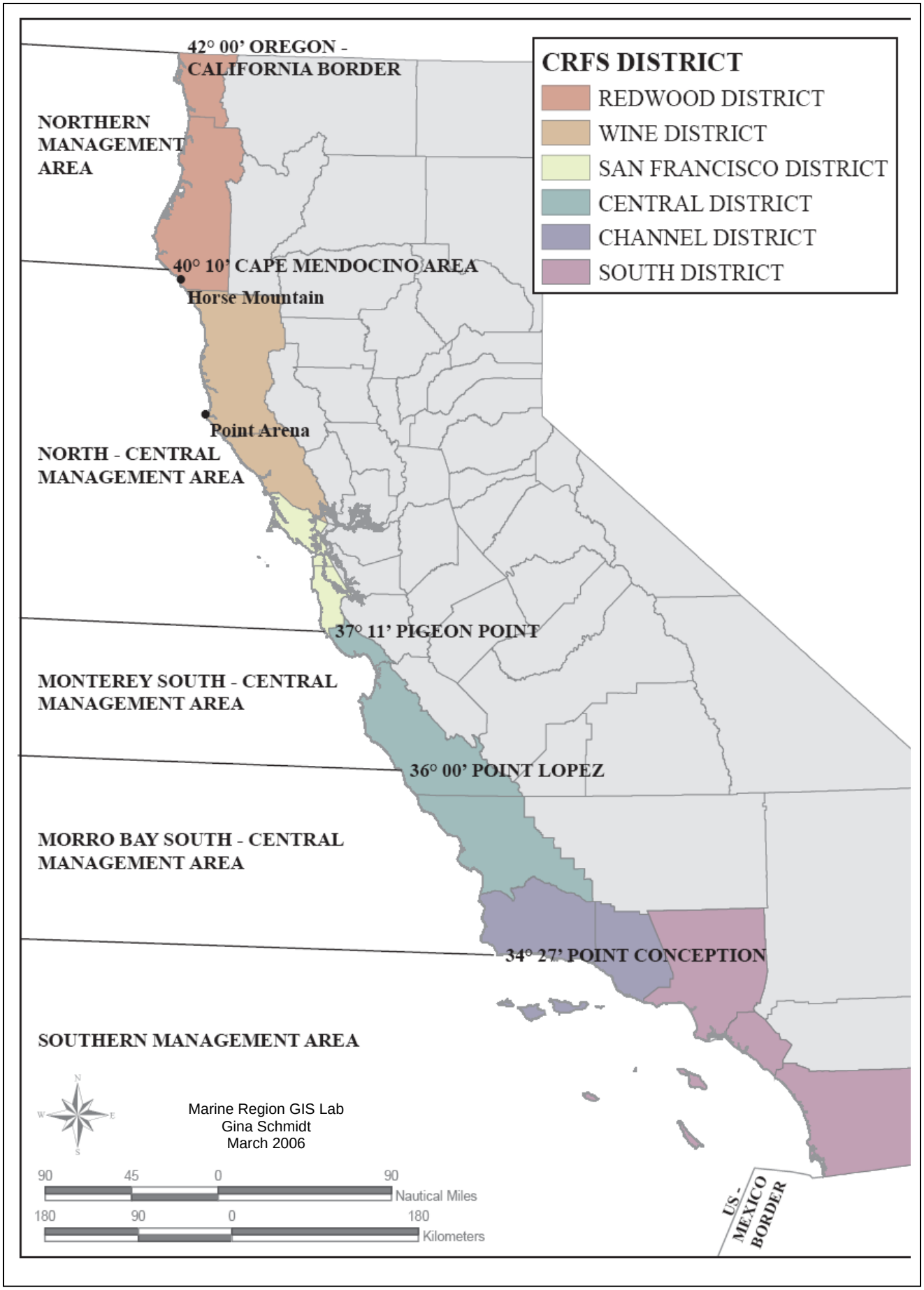
Contra Costa, Solano, Marin, San Francisco, and San Mateo counties). This highly urbanized district includes the state's largest estuary and is home to some unique sport fisheries such as white sturgeon and striped bass. Chinook salmon and California halibut also migrate into the San Francisco Bay, and are targeted by boat anglers. Offshore anglers on private boats and CPFVs fish for Chinook salmon, rockfish, lingcod and, seasonally, for albacore. Anglers catch surfperch, jacksmelt, and white croaker from piers in the bays. On the coastal beaches, anglers fish seasonally for surfperch, striped bass, and surf and night smelt.

5. Wine District - Mendocino and Sonoma counties. Most fishing in this district is for Chinook salmon, rockfish, lingcod, and cabezon. Private boats and CPFVs operate out of Bodega Bay, Fort Bragg, and Shelter Cove. These boats also target Chinook salmon seasonally. Much of the shoreline is rocky and backed by high bluffs; angler access is frequently limited by the steep terrain. Shore anglers fish for rockfish, lingcod, and cabezon. Surf fishermen fish for redtail surfperch, and can net surf and night smelt on sandy beaches.

6. Redwood District - Del Norte and Humboldt counties. This district includes one of the state's largest bays, Humboldt Bay, and several major river estuaries, including the Eel, Klamath, and Smith rivers, where salmon are targeted. Private boat and CPFV anglers from Eureka, Trinidad, and Crescent City target Chinook salmon, lingcod, and rockfish. Shore anglers fish for lingcod, greenlings, black rockfish, and blue rockfish on rocky shores and jetties. Redtail and other surfperches are taken on sandy beaches and in Humboldt Bay.

A CPFV catch of California halibut, a highly sought-after sport species.

Figure 1. CRFS Districts shown with Recreational Groundfish Management Areas.



2005 Survey Results

The CRFS effort estimates for 2005 show that over half of all fishing activity in the state occurred in San Diego, Orange, and Los Angeles counties (Table 1). The South District had the most trips in each of the four fishing modes. In general, the further north the district, the lower the effort, with the exception of the San Francisco District which had the second highest effort in the state. About 58 percent of the effort statewide was from anglers fishing from shore (man-made structures, beaches, and banks), and 42 percent was from anglers fishing from boats (Table 1).

By weight, the top species harvested (fish landed plus dead fish that were discarded) statewide in 2005 was Chinook salmon (Table 2). Almost all of the salmon catch was by boat anglers fishing from the Central District northward. Lingcod were also primarily taken by boat anglers fishing from the Central District northward.

Table 1. Estimated total number of angler trips in 2005, by district and fishing mode.

	Fishing Mode				
District	**Man-made Structures**	**Beaches & Banks**	**CPFV[1]**	**Private & Rental Boats**	**District Total**
South	518,763	210,974	254,646	326,010	1,310,393
Channel	69,037	136,582	33,118	47,653	286,390
Central	42,382	67,985	28,811	78,148	217,326
San Francisco	75,637	202,895	42,215	90,835	411,582
Wine	6,603	37,053	4,339	62,654	110,649
Redwood	25,786	21,333	1,265	61,035	109,149
Statewide	738,208	676,822	364,394	666,335	2,445,759

[1] Commercial passenger fishing vessels

Pacific mackerel catch was ubiquitous on man-made structures in the South District. Striped bass were caught almost exclusively in the San Francisco District by both boat and shore anglers. Barred sand bass totals decreased to less than half of the 2004 harvest, but it was still one of the top species in the state. Private boat and CPFV anglers from the South, Channel, Central, and Wine districts all had significant numbers of vermilion rockfish. Pelagic and migratory species such as yellowtail, albacore, Pacific bonito, and Pacific barracuda made up a large part of the catch by CPFVs and private boat anglers in the South District. Southern boat anglers also accounted for most of the

kelp bass and California halibut. White croaker and jacksmelt were caught in large numbers by shore-based anglers from the San Francisco District southward. Barred surfperch was the top species taken by beach anglers from the Central and Channel districts. Most of the rockfish species on the list were taken by boat anglers throughout the state, with the exception of black rockfish, with over two-thirds of the catch coming from the Redwood District.

The CRFS estimates are made available to the public online at the Recreational Fisheries Information Network website (www.RecFIN.org). The data can be accessed by using several different queries provided on the website or by submitting an online data request.

Table 2. By weight, the top 20 species harvested (fish landed and fish discarded dead) statewide in 2005.

Common Name	Metric Tons
Chinook salmon [1]	601.0
Lingcod	352.5
Pacific mackerel	285.7
Striped bass	283.3
Barred sand bass	246.1
Vermilion rockfish	223.8
California halibut	209.1
Black rockfish	188.7
Blue rockfish	169.1
Pacific barracuda	121.0
Kelp bass	110.3
Jacksmelt	103.7
Barred surfperch	83.0
Yellowtail	75.9
Albacore	72.4
Pacific bonito	57.3
Brown rockfish	55.2
Olive rockfish	54.7
Copper rockfish	50.6
White croaker	47.3

Data is preliminary

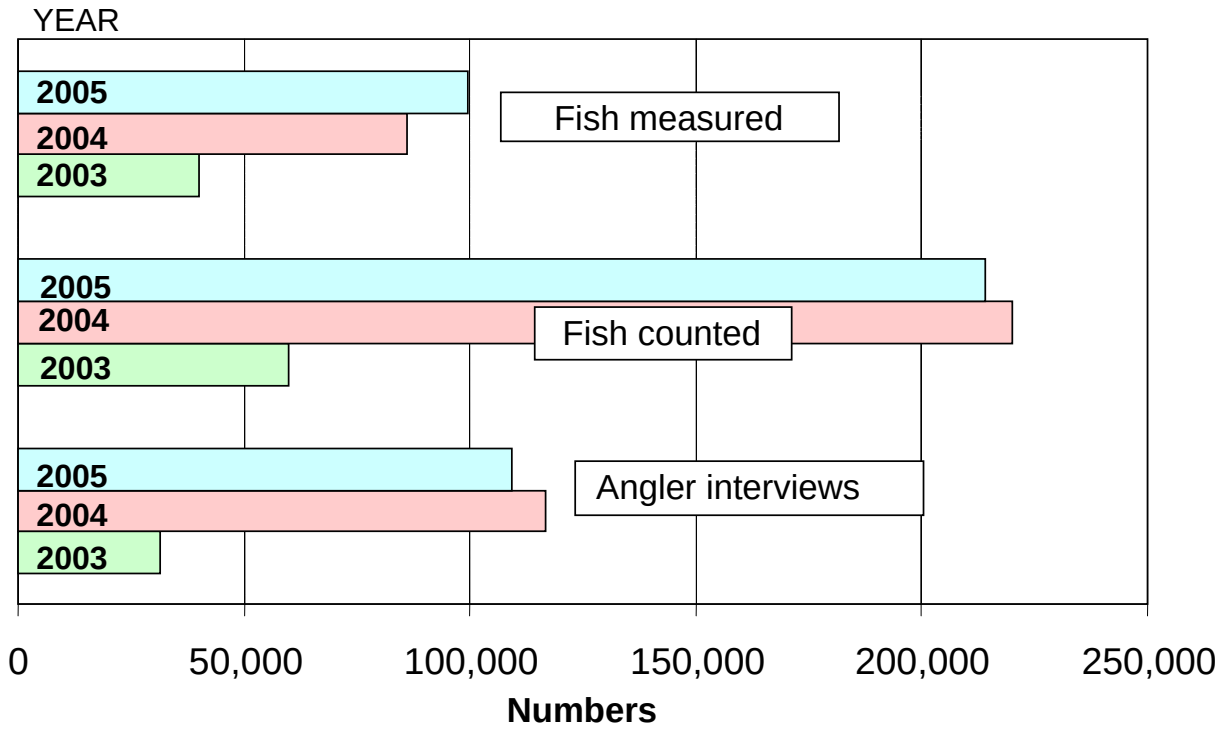
[1] 2005 Chinook salmon estimates are based on the number of fish landed and the number of fish lost to bycatch mortality and an average weight of 8 pounds per fish.

Achievements

The CRFS faced many challenges in its first two years of operation: implementing a statewide field sampling program with over 50 field samplers and with unique sampling protocols for each fishing mode; resolving logistical problems that weren't anticipated during the planning process; creating computer programs to generate catch and effort estimates and to check for data errors; managing large amounts of data; and creating and implementing a telephone survey of licensed anglers to provide effort estimates for angler activities that cannot be estimated by direct observation. The CFRS successfully met these challenges, and by the fall of 2005 was producing monthly estimates one month after the end of the sampling period.

The CRFS field supervisors and samplers worked diligently in 2004 and 2005 to maximize the field sampling effort. As a result, field samplers conducted more than 100,000 angler interviews and examine over 200,000 fish each year. Each year the CRFS conducted more than three times the number of angler interviews, examined more than three times the number of fish, and measured more than twice the number of fish than the previous statewide survey (Figure 2). This success would not have been possible without the cooperation of recreational anglers and CPFV operators.

Figure 2. A comparison of annual sampling measures for CRFS in 2004 and 2005 with those for the previous statewide sampling program in 2003.



The CRFS staff, as part of their day-to-day duties, provided information about CRFS to the public. Field samplers interact with anglers and respond to their questions and concerns. The district field supervisors developed an informational brochure about CRFS. Additional outreach activities included articles written by CRFS staff that appeared in the Department's *Marine Management News*, *Outdoor California*, and in the marine sport fishing regulations booklet (Appendix C). A website was also created (http://www.dfg.ca.gov/mrd/crfs.html) to answer questions about CRFS. Favorable articles about the CRFS have also appeared in fishing magazines and newspapers.

The CRFS data were used to manage California's marine fisheries, including in-season management decisions. Because catch and effort are reported by six geographical districts, managers were able to track catches in each district and to provide increased fishing opportunities in some areas while protecting overfished stocks. In addition, managers had increased confidence in the data used to close fisheries when harvest limits were reached.

Challenges and Plans

Perhaps the greatest challenge that any new program like CRFS faces is validating the catch and effort estimates. While the Department believes the CRFS estimates are more accurate and precise than estimates from the previous program, we continue to identify and address data shortcomings. In addition, we are conducting studies to verify the assumptions made in designing the sampling program. The Department is also continually looking for ways to reduce costs and increase the speed at which estimates can be produced.

The Department, along with the PSMFC, undertook a number of tasks in 2005 to increase the confidence level of the estimates. These included: conducting sampler deployment reviews, enhancing data processing, and evaluating the computer estimation programs. Other current activities and plans to improve the CRFS program and the estimates are described below.

<u>Improving effort estimates from the telephone survey of licensed anglers</u>

One of the most significant challenges in obtaining accurate estimates of recreational catch is determining effort, that is, how many anglers participate in the fishery and how many trips they make. Analyses have shown that the greatest variance (uncertainty) is in the effort component of the catch estimates. CRFS estimates effort from direct field observation where feasible, because this is considered the most accurate method for estimating effort. The CRFS uses data from a telephone survey of licensed anglers to estimate effort when field observations of effort are not feasible, such as fishing at night and fishing from boats that return to private marinas.

The CRFS successfully completed telephone interviews with about 10,000 licensed anglers in 2004. The variance for the effort estimates based on the phone

survey was higher than desired. Since variance tends to decline when sample size is increased, the numbers of completed interviews was doubled in 2005. The number of calls will be increased again in 2006 with a target of 26,000 completed interviews.

The number of completed interviews by the telephone survey (about 10,000 in 2004 and about 20,000 in 2005) is small compared to the number of angler interviews in the field (about 117,000 in 2004 and about 109,000 in 2005). While the number of interviews completed by the telephone survey will never approach the number completed by the field survey, we would like to increase the number of calls. However, we cannot increase the number of calls until we increase the size of our volunteer pool of licensed anglers. The volunteers for the telephone survey are recruited when they purchase their sport fishing license. License vendors are asked to obtain the name and telephone number of one volunteer for each book of 20 licenses. In 2004 and 2005, the response rate was about 30 percent which resulted in a pool of less than 30,000 licensed anglers.

The Department is initiating a number of short-term and long-term plans to increase the number of volunteers for the telephone survey. The Department is working to improve cooperation by license vendors and the public by producing and distributing materials to explain the purpose of the telephone survey and the relation between the catch estimates and fishing season, size limits, and bag limits. The Department plans to replace the current paper-based licensing system with the automated license data system beginning in July 2007 with full implementation planned for December 2007. The automated license data system will provide the Department with data on each of the two million license buyers, and will provide timely and accurate data on license sales.

Validating estimates for boats returning to private marinas, docks, and moorings

The CRFS began testing some methods for direct field observation of boats returning to private marinas, docks, and moorings in 2005. On-the-water interviews were tried in 2005; boats were intercepted in San Diego and Mission bays as they returned to private marinas and asked about their fishing activities. The CRFS plans to investigate additional methods in 2006. The information from these studies will be used to validate the effort estimates from the telephone survey of licensed anglers, and may lead to alternate methods for sampling private access and night fishing.

The CRFS conducted a volunteer logbook program in 2004 and 2005 to validate the assumption that anglers on boats returning to private marinas, docks, and moorings target the same species, fish in the same areas, and have the same catch rates as anglers on boats returning to public launch ramps. Two years of data are being analyzed to answer those and other questions. The data will also help document the prevalence of night fishing by private boats.

Reducing duplication

Estimates of the number of anglers fishing from CPFVs each month are based on a telephone survey of active boats. Ten percent of the CPFVs in each of the six CRFS districts are contacted each week to learn the number of trips taken and the number of anglers fishing on each trip. The CPFV operators are also required by State law to complete a Department-issued logbook for each trip taken and submit the logbooks to the Department at the end of each month. In an effort to reduce the burden on CPFV operators and reduce the costs of CRFS, we tested using the data from the required Department logbooks to estimate effort for one month and one district in 2005. The test showed that the lag time in receiving the logbooks hindered timely analysis. CRFS could not use the data from the current logbooks and meet the schedule of producing preliminary estimates within one month after the end of the sampling period. Further work is planned to develop methods to integrate the logbook data into CRFS estimates.

Over 65,000 forms were submitted by CRFS field samplers in 2005. The data on each of these forms must be entered into a computer database by hand, and the database must be checked for errors. The time for data processing could be reduced if data could be directly entered into a database in the field. A review of electronic data collection devices, such as electronic data loggers and small portable personal computers, was completed in 2005. It was determined that these devices weren't suitable for use in all phases of the survey. However, they do hold some promise for streamlining certain parts of the survey. The CRFS hopes to field test some of these devices in 2006 or 2007.

Continuing independent evaluation

The Pacific Fishery Management Council (PFMC) and the Recreational Fisheries Information Network (RecFIN) plan to hold a workshop in the summer of 2006 to review the marine recreational sampling programs in Washington, Oregon, and California. Each survey will be reviewed to ensure it meets the needs of the PFMC for fisheries management and stock assessment.

At the request of the National Oceanic and Atmospheric Administration, the National Research Council (part of the National Academy of Sciences) is evaluating recreational fisheries survey methods that are used in state/federal cooperative marine programs such as CRFS. The National Research Council report is expected to be completed in spring of 2006, and it is expected to include recommendations on ways to improve current survey methods and suggestions of alternative approaches.

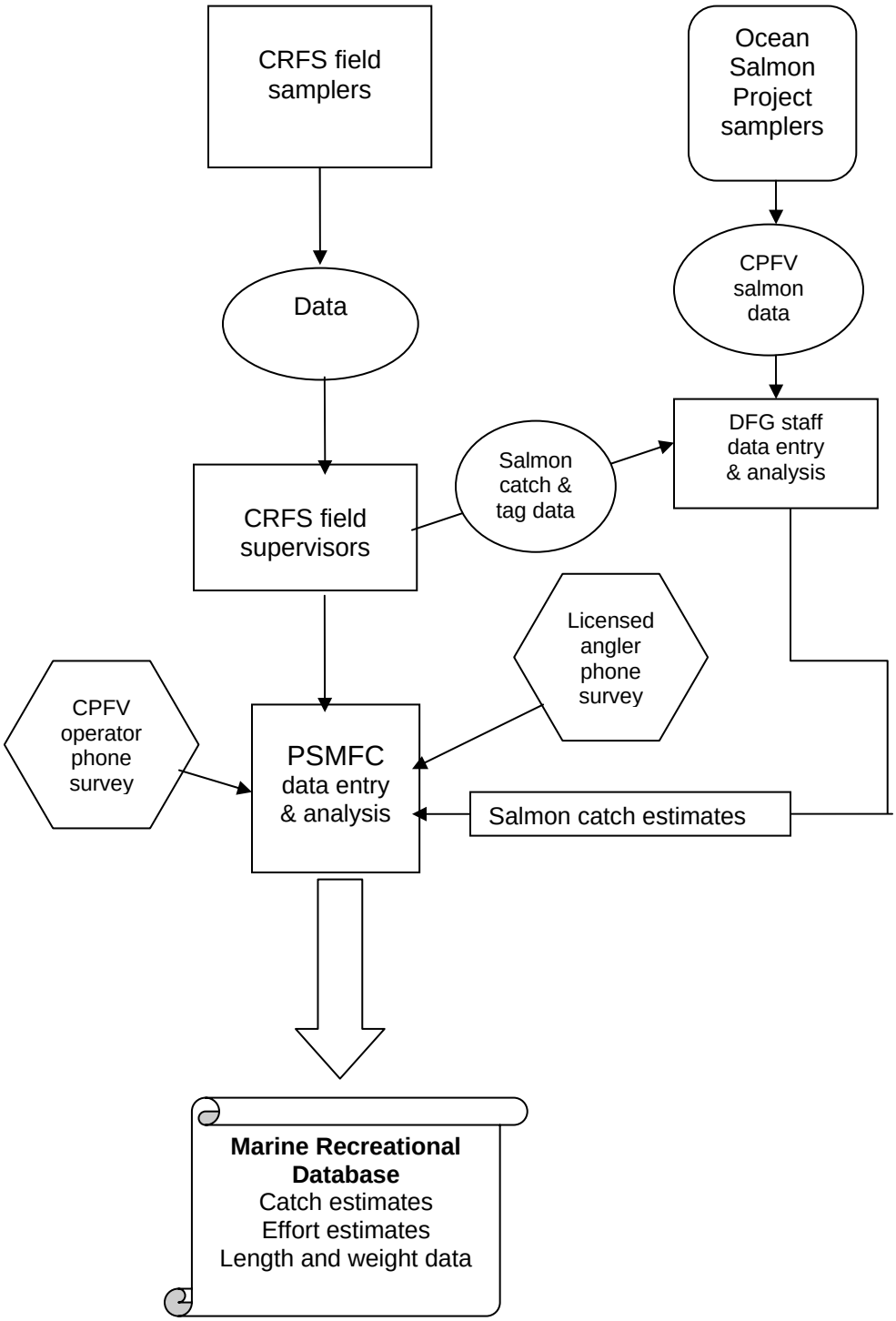
The Department and PSMFC will use the recommendations from the PFMC-RecFIN workshop and the National Research Council report to improve CRFS.

Appendix A

Appendix A. Standards and Criteria for Surveying California's Marine Recreational Fisheries.

- Sampling period – monthly
- Reporting time unit – preliminary estimates within one month of the end of the sampling period
- Geographic units – 6 districts
- Fishing area – all marine waters (differentiating between inside and outside 3 miles from shore and inside of enclosed bays or harbors)
- Modes – all modes [Private/Rental Boats, CPFVs (Party/Charter), Beaches and Banks, Man-Made Structures]
- Species – all finfish
- Data elements include, but not limited to:
    - Date and time of sampling
    - Port/landing
    - Fishing location – point (latitude/longitude); if not available, by one mile blocks
    - Bottom depth
    - Gear
    - Number of anglers
    - Type and number of fish kept and discarded
    - Fish size
    - For CPFVs only, marine mammal interaction information – presence/absence and a minimum; more specific information (number of interactions, any fish, gear, or fishing time lost) if possible.
- Precision – for catch estimates, strive for proportional standard errors that are ≤ 0.20

Appendix B. CRFS data collection, processing, and analysis.



Appendix C. Articles on CRFS.

Article in *Marine Management News* (March 2005) titled California Recreational Fisheries Survey Completes First Year by DFG Staff.

Article in *Marine Management News* (June 2005) titled Not Just Another Day on the Job by Ed Roberts.

Article in *Marine Management News* (September 2005) titled The Scientific Side of the Hot Salmon Bite by Jayna A. Schaaf.

Article in *License Agent News* (November 2005) titled Your Cooperation is Critical by DFG Staff.

Article in *Outdoor California* (Nov-Dec 2005) titled Not Just Another Day on the Job by Ed Roberts.

Article in *2005 California Ocean Sport Fishing Regulations Booklet* titled New Saltwater Angler Survey Under Way by DFG Staff.